

## The Carbon Cycle

Use the attached color plate + text pg. 54-55 + pg. 128 to complete the following.

- ① Carbon is important to life because:
- ② Carbon is a \_\_\_\_\_ cycle because it is transported between the atmosphere, living things, water, and soil, rocks, & minerals.
- ③ Major reservoirs of carbon on Earth are:
- ④ Carbon moves from the atmosphere to plants through the process of \_\_\_\_\_.
- ⑤ Carbon moves from plants to animals when:
- ⑥ Carbon moves from plants and animals to the ground through the process of \_\_\_\_\_. Some become buried miles underground and will become \_\_\_\_\_ in millions and millions of years.
- ⑦ Carbon dioxide from the air can dissolve in \_\_\_\_\_. Carbon can be found in oceans in the following forms:

⑧ Carbon is released by living things into the atmosphere by the process of \_\_\_\_\_. Other ways in which carbon enters the atmosphere include:

⑨ Atmospheric carbon dioxide might produce a "greenhouse effect" by trapping heat near the Earth's surface. Human activities that may increase the "greenhouse effect" include:

⑩ You are a carbon atom. For millions of years you were underground in fossil fuels. Now, you have been released into the atmosphere as humans burn fuels. You will travel through the carbon cycle getting to each major source of carbon before returning to the Earth and becoming a fossil fuel again. Explain your trip through the carbon cycle in the written form of your choice (diagram, cartoon, written paragraph, flowchart, story etc.)

## Chapter 11-10: The Carbon Cycle

Energy flows from the sun into the biosphere, but nutrients do not enter the biosphere from an outside source. Essentially, the same pool of nutrients has circulated for the billions of years that the Earth has been in existence. Some nutrients, called macronutrients, are used by organisms in large quantities, while others, micronutrients, are used only in trace quantities. Macronutrients include carbon, hydrogen, oxygen, nitrogen, and phosphorus; micronutrients include iodine, iron, zinc, and some others.

Both macronutrients and micronutrients are recycled; they are passed back and forth between living and nonliving components of the ecosystem in processes that we call biogeochemical cycles. This plate and the ones that follow trace the pathways of several elements through biogeochemical cycles.

The prime focus of this plate is on the arrows that show how carbon travels among components of the biosphere. You should use darker colors for the arrows.

Material substances are incorporated into organic compounds by primary producers. Primary producers are then consumed by secondary consumers, and decomposers are ultimately responsible for releasing the material back into the nonliving environment.

We will begin our study of the carbon cycle with the **atmosphere (A)**, which is Earth's major reservoir of carbon, in the form of carbon dioxide. Carbon enters the biotic (living) part of the ecosystem through **photosynthesis (B)**. We suggest a green color for the arrow. Plants of the **forest (C)** take the carbon in carbon dioxide and fix it in organic compounds such as glucose, starch, cellulose, and other carbohydrates. **Respiration in plants (D)** returns carbon dioxide to the atmosphere; an arrow shows this process.

We have seen how carbon enters the cycle of living things through photosynthesis, and we will now see how it passes through various life forms. Continue your reading below as you color.

Plants are primary producers. In the course of **plant consumption (E)**, carbon passes into primary consumers, animals. When **animal consumption (F)** occurs, or when the primary consumer is eaten, carbon passes to a secondary consumer, represented by the lion in the plate. **Respiration (G)** takes place in cells of the primary and secondary consumers, and carbon is released back into the environment as carbon dioxide.

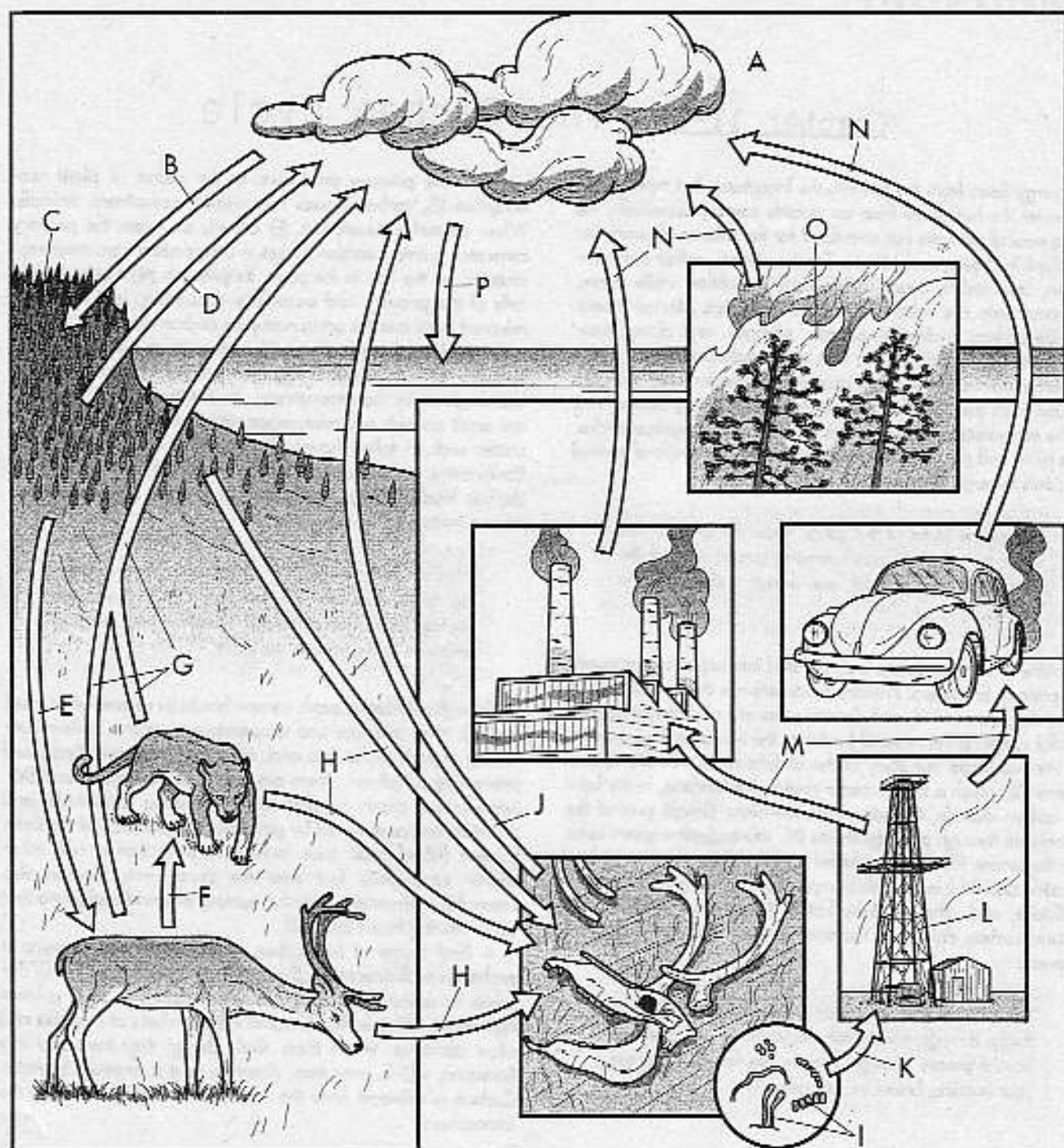
When the primary and secondary consumers die, their organic matter enters the soil through the process of **decay (H)**. It is broken down by the decomposers, or **detritus feeders (I)**, which are small animals and microorganisms that subsist on decaying matter such as fallen leaves, dead bodies, and animal waste. Earthworms, mites, centipedes, insects, and crustaceans are detritus feeders. Thus, **respiration in detritus feeders (J)** also returns carbon to the atmosphere.

We have seen how carbon cycles through various living things on Earth. We will now turn to a storage process for carbon in the soil. Continue your reading below as you complete the plate.

Throughout history, much carbon has been **converted to fossil fuel (K)**. High pressure and temperature transform carbon-containing organic matter into coal, oil, and natural gas. **Fossil fuel processing (L)** follows. There are many **uses for fossil fuels (M)**. Some power plants generate electricity using fossil fuels, and automobiles are powered by gasoline. The **products of the combustion (N)** of fossil fuels include carbon dioxide and other carbon compounds that enter the atmosphere. Carbon also enters the environment from the burning of wood and plants that occurs during **forest fires (O)**.

A final aspect of the carbon cycle that we will examine is **exchange with oceans (P)**. Some carbon dioxide from the air dissolves in oceans and combines with calcium to form calcium carbonate, which is incorporated into the shells of mollusks and other creatures. When these shells decay, they transform into limestone, which, over time, dissolves as it is exposed to water. Carbon is released from the limestone and may return to the atmosphere.





### The Carbon Cycle

- Atmosphere .....A
- Photosynthesis .....B
- Forest .....C
- Respiration in Plants...D
- Plant Consumption.....E
- Animal Consumption ....F

- Respiration in Animals.....G
- Decay.....H
- Detritus Feeders .....I
- Respiration in Detritus Feeders.....J
- Conversion to Fossil Fuel .....K

- Fossil Fuel Processing .....L
- Uses for Fossil Fuel ..M
- Products of Combustion .....N
- Forest Fire.....O
- Exchange with Oceans ..P